

1 CLAIMS

2 What is claimed is:

3 1. An electron emitter comprising:

4 a p region;

5 a dielectric layer formed above said p region; and

6 a metallic layer formed above said dielectric layer.

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8 2. The electron emitter according to claim 1, further comprising:

9 a substrate below said p region.

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11 3. The electron emitter according to claim 1, wherein said p region is formed
12 from a semiconductor.

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14 4. The electron emitter according to claim 3, wherein said semiconductor
15 includes at least one of Si, Ge, GaP, InP, InGaAs, and InGaP.

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17 5. The electron emitter according to claim 3, wherein hole concentration
18 level of said p region ranges substantially between 10^{16} and 10^{19} cm^{-3}

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20 6. The electron emitter according to claim 1, further comprising:
21 a p electrode formed above and making electrical contact with said p region.

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23 7. The electron emitter according to claim 1, further comprising:
24 an M electrode formed above and making electrical contact with said metallic
25 layer.

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2 8. The electron emitter according to claim 1, further comprising:
3 an n+ region formed above a substrate such that said p region is formed within
4 said n+ region.

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6 9. The electron emitter according to claim 8, wherein an electron
7 concentration level of said n+ region is greater than a hole concentration level of said p
8 region.

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10 10. The electron emitter according to claim 8, wherein said n+ region is
11 formed from materials with wider band gap than said p region.

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13 11. The electron emitter according to claim 8, wherein a thickness of said p
14 region is less than a diffusion length of non-equilibrium electrons in said p region.

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16 12. The electron emitter according to claim 8, wherein a thickness of said
17 metallic layer is on the order of or less than a mean free path for electron energy.

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19 13. The electron emitter according to claim 8, further comprising:
20 an n electrode formed above and making electrical contact with said n+ region.

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22 14. The electron emitter according to claim 1, wherein said metallic layer 240
23 is formed from materials including at least one of Au, Ag, Al, Gd, W, Pt, Ir, Pd, and
24 alloys thereof.

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1 15. A method to fabricate an electron emitter, comprising:
2 forming a p region;
3 forming a dielectric layer above said p region; and
4 forming a metallic layer above said dielectric layer.

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6 16. The method to fabricate an electron emitter of claim 15, according to claim
7 15, further comprising:
8 forming said p region above a substrate.

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10 17. The method to fabricate an electron emitter according to claim 15, further
11 comprising:
12 forming an n+ region above a substrate such that said p region is formed within
13 said n+ region.

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15 18. The method to fabricate an electron emitter according to claim 18, further
16 comprising:
17 forming an n electrode above and making electrical contact with said n+ region.

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19 19. The method to fabricate an electron emitter according to claim 15, further
20 comprising:
21 forming a p electrode above and making electrical contact with said p region.

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1 20. The method to fabricate an electron emitter according to claim 15, further
2 comprising:
3 forming an M electrode above and making electrical contact with said metallic
4 layer.
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